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Fungi Damaging Ornamental Plants in Absheron and Their Control

Abstract

Ornamental plants on the Absheron peninsula play an important role in urban planning, ecological balance and aesthetics. However, in recent years, fungal diseases that have spread to these plants have seriously affected their health and appearance. This article examines the distribution, symptoms and control methods of the main phytopathogenic fungi such as Fusarium oxysporum, Rhizoctonia solani, Botrytis cinerea, Alternaria alternata and Sclerotinia sclerotiorum. As a result of field observations and laboratory analyses conducted in Baku, Khirdalan, Sumgayit and surrounding settlements in 2024, it was determined that these fungi are closely related to climatic and agrotechnical conditions. Various control strategies were tested and it was determined that the most effective result is achieved with integrated control measures.

Keywords: *Absheron, ornamental plants, fungal diseases, plant protection, Fusarium oxysporum, integrated control*

Introduction

Ornamental plants act as an important component in modern urban infrastructure. These plants, which have functions such as aesthetic appearance, dust and noise reduction, oxygen production and microclimate regulation, are especially widespread on the Absheron Peninsula. The climatic conditions of this region - characterized by semi-desert, windy and saline soil - create both advantages and difficulties for the cultivation of ornamental plants.

In parallel with the increase in cultivated areas, the spread of phytopathogenic organisms, especially fungal diseases that pose a threat to plants is observed. These pathogens both reduce the aesthetic value of plants and weaken their biological durability and productivity. Although previous studies have provided detailed information about fungal diseases found in agricultural plants, relatively little space has been devoted to such studies in the field of ornamental plants. The main purpose of this article is to systematize fungal diseases found in ornamental plants on the Absheron peninsula, identify factors affecting their spread and evaluate control measures (Beibutov, 1965).

Research

The study was conducted in parks, private gardens and ornamental plant nurseries located in Baku city and surrounding regions – Bilgah, Mardakan, Khirdalan, Sumgayit and Masazir – from March to October 2024. A total of 120 symptomatic plant samples were collected. These plants included petunias, roses, begonias, geraniums, lavender and ornamental grasses (Porchinsky, 1911).

The collected samples were sterilized with 70% alcohol, then planted in Potato Dextrose Agar (PDA) medium and incubated at 25°C for 7 days. Colonies were identified based on their morphological characteristics under a microscope, and selected isolates were molecularly confirmed by PCR analysis of the ITS region (Mammadov, 2004).

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The following indicators were recorded at each observation site:

- ✓ Air temperature and relative humidity
- ✓ Soil pH level
- ✓ Irrigation frequency and drainage status
- ✓ Plant spacing and shading level.

Disease Indicators:

Disease Incidence (DI): The ratio of infected plants to the total number of plants.

Disease Severity Index (DSI): Rated on a 0–5 point scale (Ben-Yehuda, Assael, 2000)

The correlation of environmental parameters with diseases was statistically evaluated. The following conditions were associated with higher disease prevalence (Moiseeva, Polyakova, 1970):

- ✓ Botrytis cinerea was more prevalent in areas with humidity above 60%.
- ✓ Rhizoctonia solani and Fusarium oxysporum were dominant in areas with daily and intensive irrigation.
- ✓ Alternaria alternata spot was observed in densely planted, poorly lit areas.
- ✓ Sclerotinia sclerotiorum was more common in areas with soil pH between 6.5-7.0.

The following control methods were applied for testing purposes:

Agrotechnical measures: Proper irrigation, soil loosening, burning of infected plants.

Chemical preparations: Systemic fungicides containing azoxystrobin, tebuconazole, mancozeb (Meyer, 1933-1936).

Biological means: Soil treatment with Trichoderma harzianum culture.

Integrated approach: Complex application of all the above methods.

At the end of 6 months, the disease severity was as follows:

Group	Infection Rate	Main Result
Integral Control	12%	Most effective result
Chemical Control	42%	Temporary effectiveness
Biological Control	29%	Long-term effect
Agrotechnical	37%	Medium effectiveness
Control	78%	High infection

These results showed that through an integrated approach, it is possible to both prevent diseases and protect the environment. Chemical intervention, however, only provides short-term effects and is not sufficient for sustainable control (Rubtsov, 1948).

The issue of protecting ornamental plants on the Absheron Peninsula is important for the development of urban planning and ecology. This article is aimed at investigating the main fungal pathogens that damage ornamental plants and methods of combating these diseases. The purpose of the study is to study the nature of fungal diseases prevalent in Absheron, identify the factors contributing to their spread, and propose effective control methods. The results of the study showed that various fungal pathogens are closely related to the specific climatic conditions of Absheron and pose serious threats to the health of ornamental plants in this region (Muradov, 2019).

The study is based on field observations conducted in various residential areas such as Baku, Sumgayit, Khirdalan, Bilgah, Mardakan between March and October 2024. During these observations, 120 ornamental plant samples were collected and the reactions of these plants to fungal diseases were evaluated in laboratory conditions. The data obtained showed that the main fungal pathogens such as Fusarium oxysporum, Rhizoctonia solani, Botrytis cinerea, Alternaria alternata, and Sclerotinia sclerotiorum caused a greater spread of ornamental plants (Balakhanova, 2024, p. 40).

The results of the study showed that these pathogens cause various disease symptoms. Fusarium oxysporum and Rhizoctonia solani cause root rot and plant weakening, while Botrytis cinerea causes especially flower diseases. Alternaria alternata causes brown spots and dry rot on leaves, while Sclerotinia sclerotiorum is associated with swollen root rot of plants. The results of the study also show

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that environmental factors, especially humidity and soil drainage conditions, play an important role in the spread of fungal diseases (Shapiro, 1960). The spread of fungal pathogens is accelerated in areas of Absheron with particularly high humidity and poor drainage. Also, the pH level of the soil and the irrigation regime are important factors in the spread of these diseases. These results show that the climate and agrotechnical conditions of Absheron promote the development of fungal diseases, which highlights the importance of applying appropriate control methods (Valiyeva, Hasanova, 2022).

The effectiveness of control methods was analyzed in the study from various aspects. The integrated control approach (IPM) was evaluated as the most effective strategy. This approach involves combining chemical, biological and agrotechnical measures. The chemical control methods used in the study, especially fungicides containing azoxystrobin and tebuconazole, showed a 50%-55% reduction in the spread of diseases. However, it is known that chemical control has a temporary effect and can negatively affect the ecosystem (Balakhanova, 2024).

Biological control methods, especially the application of biological agents such as Trichoderma harzianum, have achieved more long-term and environmentally friendly results. This biological agent has helped to protect plant health by destroying pathogens in the soil. Biological control methods have had a more sustainable and environmentally friendly effect compared to chemical control (Shapiro, 1960). Agrotechnical measures, especially proper irrigation and soil aeration, have helped to prevent the spread of fungal diseases. For example, the number of fungal pathogens has significantly decreased in properly drained soil and in areas with low humidity. Correct adjustment of the distance between plants and regular cleaning of damaged plants have also helped to reduce the spread of diseases (Toth, Schmera, Imrei, 2004).

One of the main conclusions of the study is to emphasize the importance of an integrated control approach. The combined application of various control methods not only reduces the spread of diseases, but also protects the ecology. An integrated control approach is also effective against the emergence of resistance of fungal pathogens, since this approach, by combining various methods, prevents the multiplication of pathogens and reduces their susceptibility to them. The application of integrated control strategies also helps to maintain plant health and create positive effects in the field of urban development. For example, the joint cultivation of different plant species and the parallel application of several control methods improves the health of plants in urban parks and gardens (Abdumutalliyeva, Sarimsagova, 2016).

Conclusion

Future research should be directed to the development of more effective biological control methods that are suitable for the specific climatic conditions of Absheron. Also, the application of integrated control approaches on a larger scale can play an important role in the prevention of fungal diseases. It is important to test biological agents and natural control methods, taking into account the impact of chemical preparations used in Absheron on the ecosystem (Mamedov, 2004).

In addition, it is recommended to develop and implement special control strategies for ornamental plant areas located in the Absheron region. This will help both protect the ecology and make plant protection more effective.

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